

## **BAB VIII**

### **RENCANA ANGGARAN BIAYA DAN JADWAL PELAKSANAAN**

#### **8.1 Rencana Anggaran Biaya**

Di dalam menentukan rencana anggaran biaya dibutuhkan perhitungan volume galian dan timbunan, volume pekerjaan dan harga satuan pekerjaan yang nantinya digunakan sebagai acuan di dalam perhitungan anggaran.

##### **8.1.1 Perhitungan Volume Pembongkaran**

###### **a. Pembongkaran Lantai Bendung**

Dari gambar rencana terlampir diketahui bahwa volume bongkaran lantai bendung existing untuk saluran under sluice adalah sebesar :

$$V = 1270.796 \text{ m}^3$$

###### **b. Pembongkaran Saluran Intake**

Dari hasil perhitungan berdasarkan gambar, volume bongkaran saluran intake adalah sebesar  $302.45 \text{ m}^3$

###### **c. Pembongkaran Bangunan Penguras Kantong Lumpur**

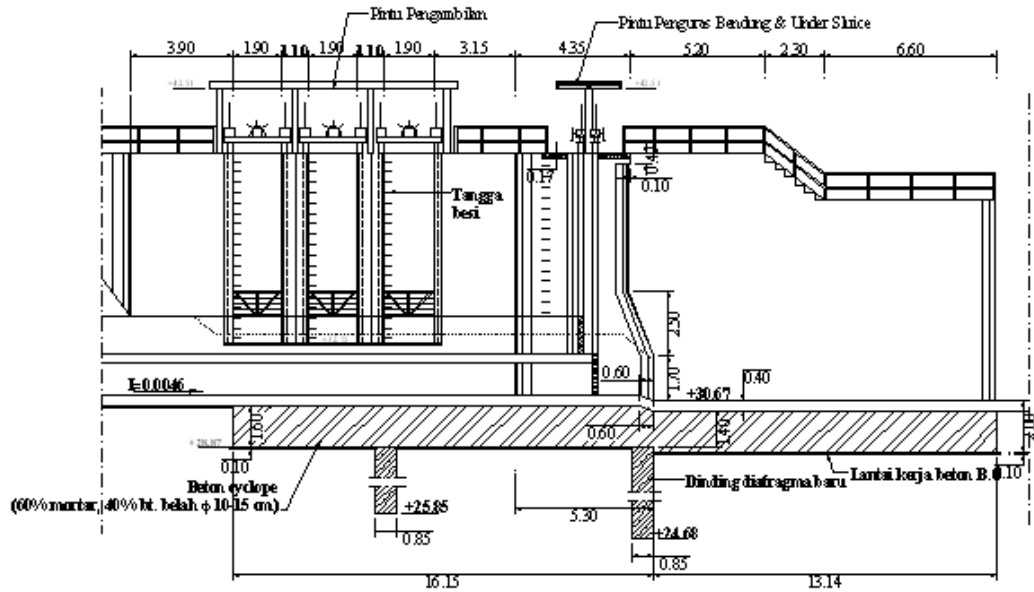
Dari hasil perhitungan berdasarkan gambar, volume bongkaran saluran intake adalah sebesar  $350,45 \text{ m}^3$

###### **d. Pembongkaran Bangunan Penerus Kantong Lumpur**

Dari hasil perhitungan berdasarkan gambar, volume bongkaran saluran intake adalah sebesar  $315.25 \text{ m}^3$

## 8.1.2 Perhitungan Volume Galian dan Urugan Tanah

### a. Galian Pondasi Bangunan Penguras

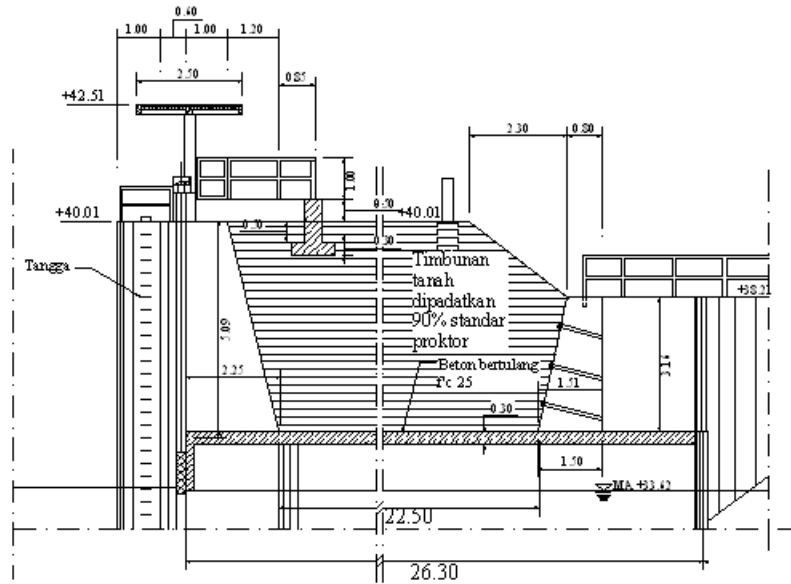


**Gambar 8.1 Galian Pondasi pada Bangunan Penguras**

Dari gambar diatas dapat ditentukan volume galian tanah untuk pondasi *under sluice* adalah sebesar =  $[1.6 \cdot 15.3 + 1.6 \cdot 13.15 + ((1.6 + 1.4) \cdot 0.5 \cdot 0.6)] \cdot 9.8$

$$= 454.916 \text{ m}^3$$

**b. Timbunan Tanah pada Saluran Pengambilan**

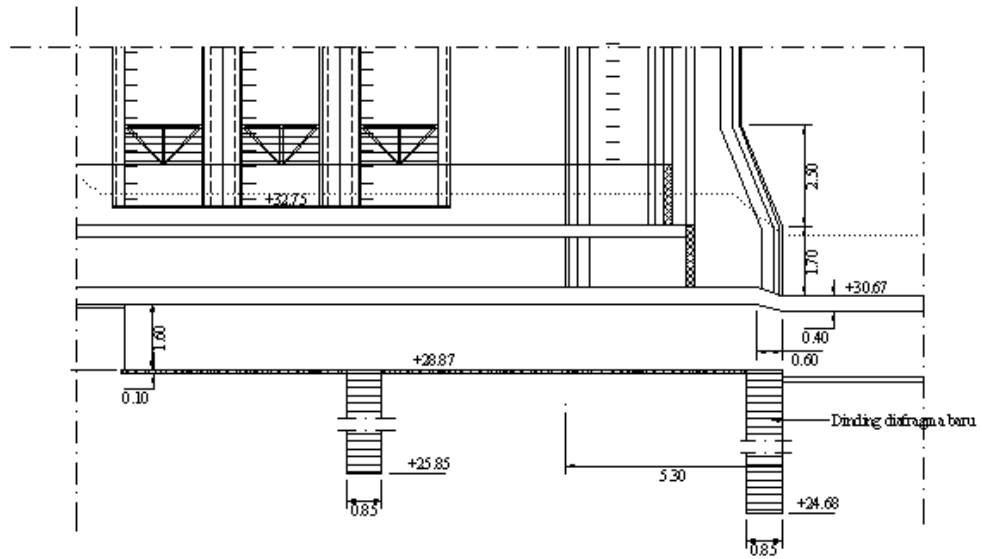


**Gambar 8.2 Timbunan tanah pada Saluran Pengambilan**

Galian tanah diatas saluran intake adalah sebesar 1372.79 m<sup>3</sup>

Dari gambar diatas diketahui volume timbunan tanah diatas saluran intake adalah sebesar 1675.24 m<sup>3</sup>

**c. Perhitungan Volume Galian Diafragma**

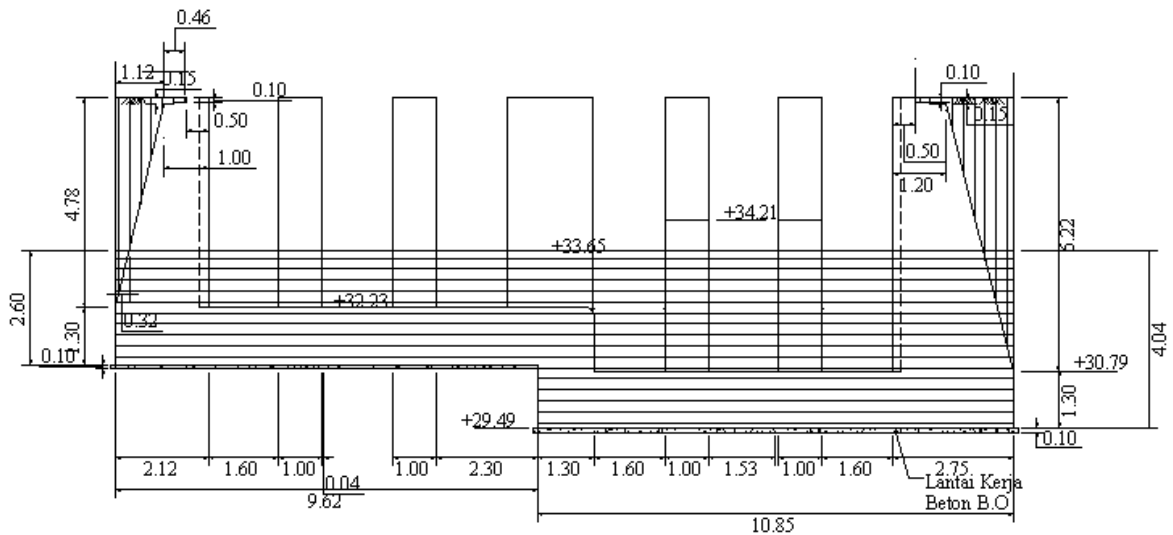


**Gambar 8.3 Galian pada Diafragma**

Besarnya volume galian untuk dinding diafragma adalah ;

$$V5 = (0.85 \times 3.02 \times 4.5) + (0.85 \times 3.99 \times 4.5) = 26.81 \text{ m}^3$$

**d. Perhitungan Volume Galian dan Timbunan Pintu Penguras Kantong Lumpur dan Pintu Penerus**



**Gambar 8.4 Galian dan Timbunan Pintu Penguras Kantong Lumpur dan Pintu Penerus**

Volume galian tanah pada bangunan pintu Penguras Kantong Lumpur dan Penerus adalah sebesar :

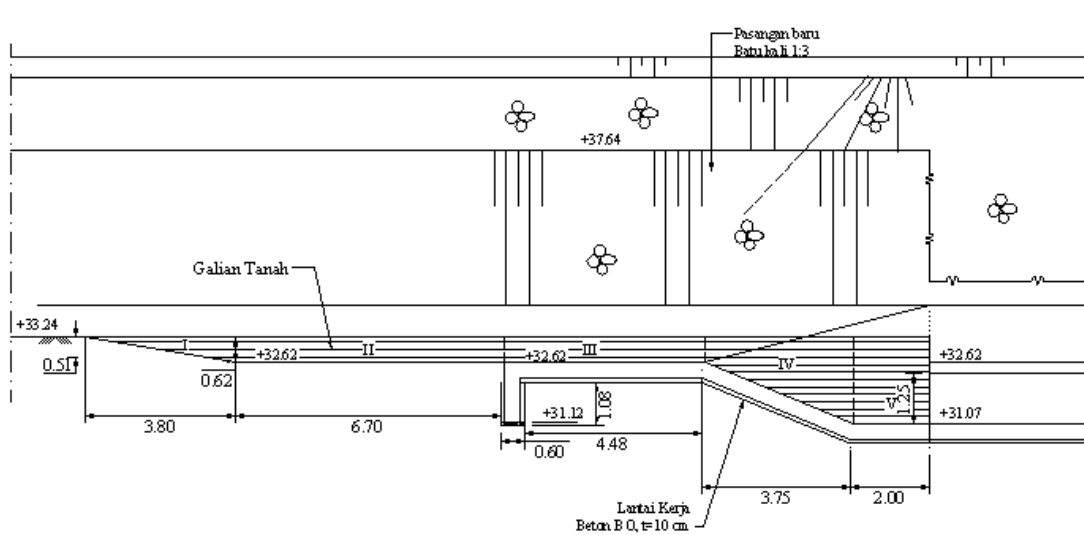
$$V = (2.7 \times 9.72 \times 24.31) + (1.4 \times 11.05 \times 24.31) = 1014,07 \text{ m}^3$$

Volume timbunan tanah pada bangunan pintu Penguras Kantong Lumpur dan Penerus adalah sebesar :

$$= [(0.15 + 0.10) \times 0.5 \times 0.46 \times 24.31] + [1.12 \times 0.15 \times 24.31] + [0.5 \times 1.12 \times 4.78 \times 24.31]$$

$$= 70,55 \text{ m}^3$$

**e. Perhitungan Volume Galian Tanah di depan Mulut Under Sluice**



**Gambar 8.5 Galian Tanah di depan Mulut Under Sluice**

Volume galian tanah :

$$I = (41.64 \cdot 0.5 \cdot 3.8 \cdot 0.62) - (0.5 \cdot 3.8 \cdot 0.62 \cdot 3.54 \cdot 0.5) = 49.97 \text{ m}^3$$

$$II = (38.1 \cdot 0.62 \cdot 6.7) - (0.62 \cdot 6.7 \cdot 8.98 \cdot 0.5) = 139.62 \text{ m}^3$$

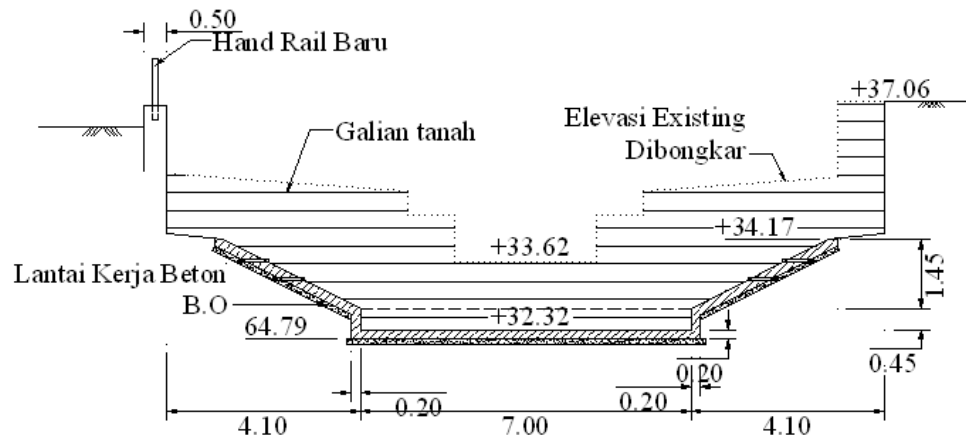
$$III = (29.12 \cdot 0.62 \cdot 5.08) - (0.62 \cdot 5.08 \cdot 9.14 \cdot 0.5) = 77.32 \text{ m}^3$$

$$IV = ((19.98 \cdot 0.62 \cdot 3.75) - (0.62 \cdot 3.75 \cdot 6.85 \cdot 0.5)) + ((0.5 \cdot 1.55 \cdot 3.75 \cdot 19.98) - (0.5 \cdot 1.55 \cdot 6.85 \cdot 0.5)) = 86.6 \text{ m}^3$$

$$V = (13.13 \cdot 1.55 \cdot 2) - (1.55 \cdot 2 \cdot 0.83 \cdot 0.5) = 39.42 \text{ m}^3$$

$$\text{Total volume galian} = 392,93 \text{ m}^3$$

**f. Galian Saluran Kantong Lumpur**



**Gambar 8.6 Saluran kantong Lumpur**

Berdasarkan gambar potongan kantong lumpur didapat perhitungan volume sebagai berikut :

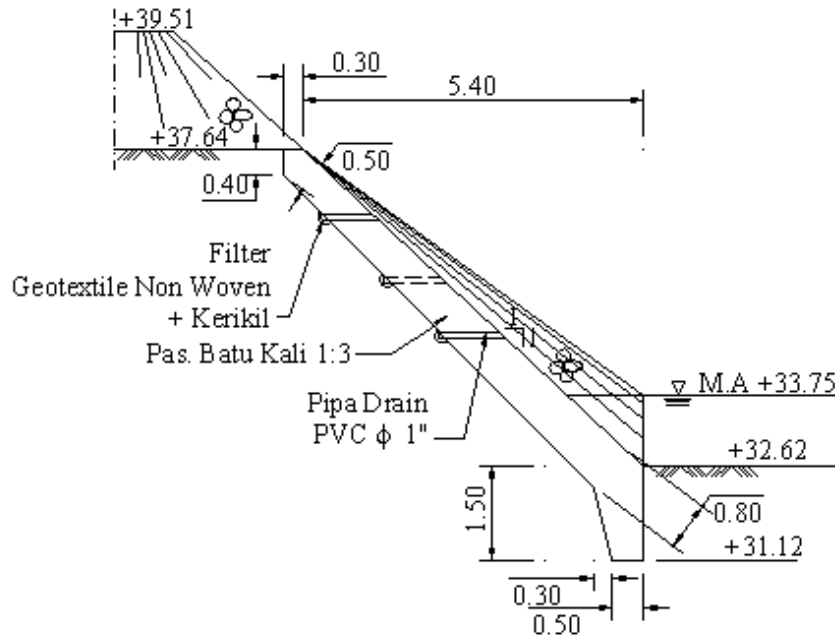
$$\text{Luas penampang} = 31.763 \text{ m}^2$$

$$\text{Panjang kantong lumpur} = 160 \text{ m}$$

$$\text{Volume galian} = 31.763 * 160 = 5080.48 \text{ m}^3$$

### 8.1.3 Perhitungan Volume Pasangan Batu Kali

#### a. Penahan Tanah Bagian Kiri Didepan Saluran *Under Sluice*



**Gambar 8.7** Penahan Tanah Bagian Kiri Didepan Saluran *Under Sluice*

Volume :

$$0.5 \times 0.3 \times 0.4 \times 11.5 = 0.69 \text{ m}^3$$

$$(0.5 + 0.8) \times 0.5 \times 6.96 \times 11.5 = 52.026 \text{ m}^3$$

$$0.5 \times 0.86 \times 0.45 \times 11.5 = 2.225 \text{ m}^3$$

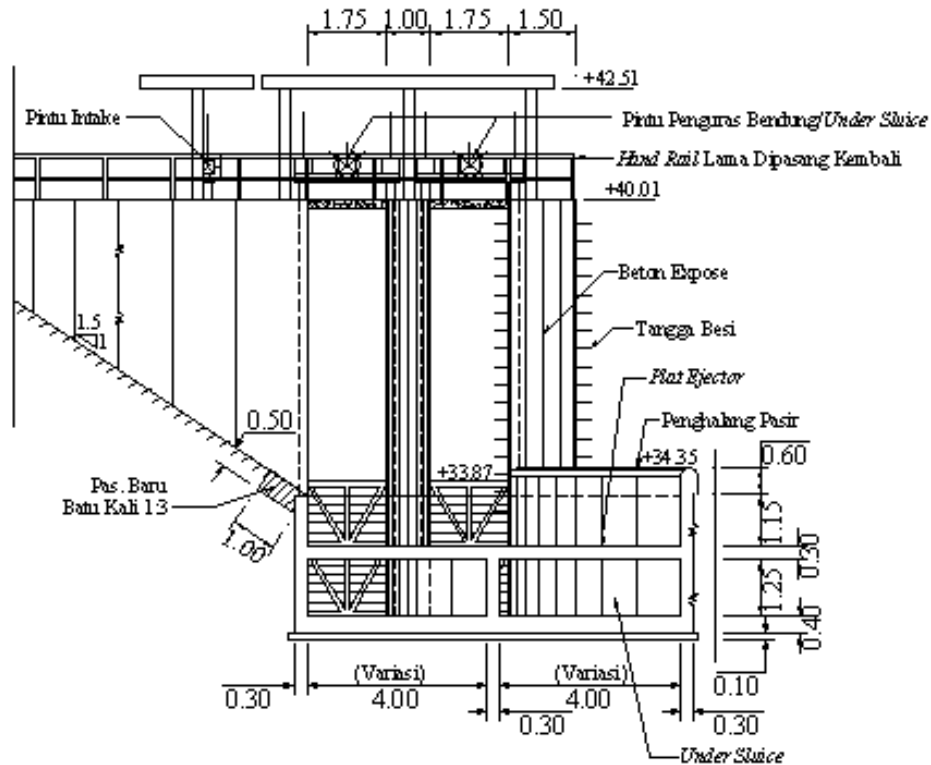
$$0.5 \times 0.8 \times 0.33 \times 11.5 = 1.518 \text{ m}^3$$

$$(0.5 + 0.8) \times 0.5 \times 1.17 \times 11.5 = 8.746 \text{ m}^3$$

$$\text{Jumlah volume keseluruhan} = 65.205 \text{ m}^3$$



**b. Penahan Tanah Bagian Kiri Saluran *Under Sluice***



**Gambar 8.8 Penahan Tanah Bagian Kiri Saluran *Under Sluice***

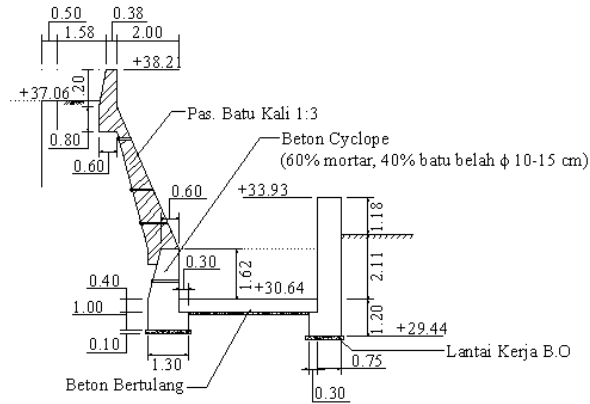
Volume :

$$0.5 \times 1 \times 18 = 9 \text{ m}^3$$

$$0.5 \times 3.8 \times 0.5 \times 3.8 = 3.61 \text{ m}^3$$

$$\text{Jumlah volume keseluruhan} = 12.61 \text{ m}^3$$

c. Tembok Penahan Tanah Disebelah Kiri Kolam Olak



Gambar 8.9 Tembok Penahan Tanah Disebelah Kiri Kolam Olak

Volume =

$$(0.38+0.6)*0.5*1.2*8.75 = 5.145 \text{ m}^3$$

$$0.6*0.8*8.75 = 4.2 \text{ m}^3$$

$$0.5*0.8*0.35*8.75 = 1.225 \text{ m}^3$$

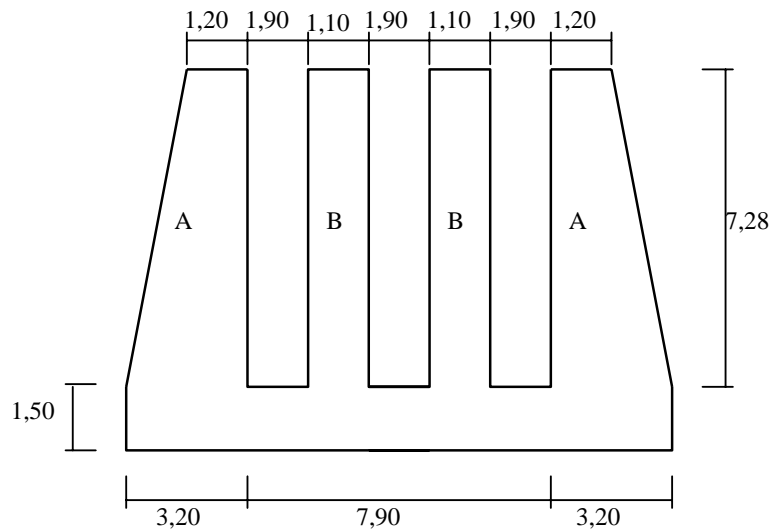
$$(0.35+1)*0.5*3.8*8.75 = 22.44 \text{ m}^3$$

$$(0.4+0.28)*0.5*0.5*8.75 = 1.488 \text{ m}^3$$

$$\text{Jumlah volume total} = 34.498 \text{ m}^3$$

### 8.1.4 Perhitungan Volume Beton Cyclope

#### a. Dinding Penahan Tanah dan Pilar pada Bangunan Pintu Pengambilan Bendung



**Gambar 8.10 Dinding Penahan Tanah dan Pilar pada Bangunan Pintu Pengambilan Bendung**

Volume :

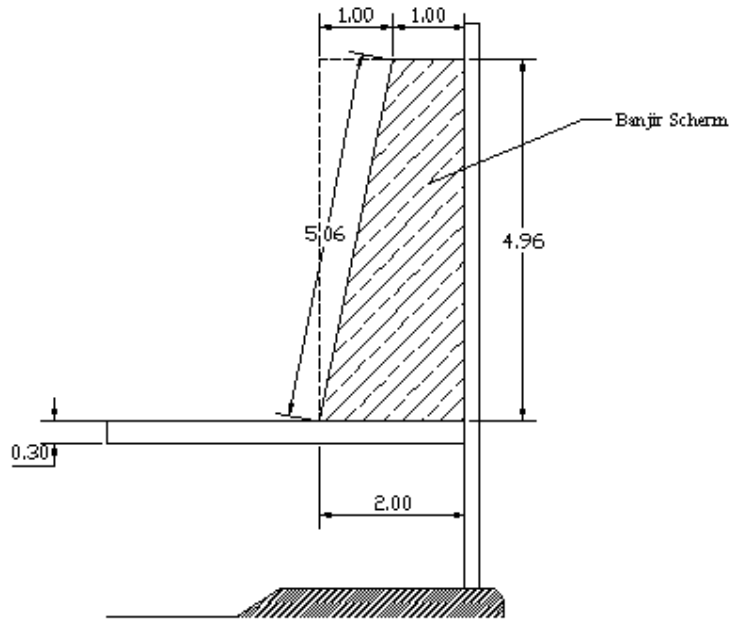
$$(3.2+1.2)*0.5*7.28*2*2 = 64.064 \text{ m}^3$$

$$1.1*7.28*2*2 = 32.032 \text{ m}^3$$

$$1.5*14.3*2 = \underline{42.9 \text{ m}^3}$$

$$\text{Volume total} = 138.996 \text{ m}^3$$

**b. Tembok Penahan Banjir pada Bangunan Pintu Pengambilan Bendung**

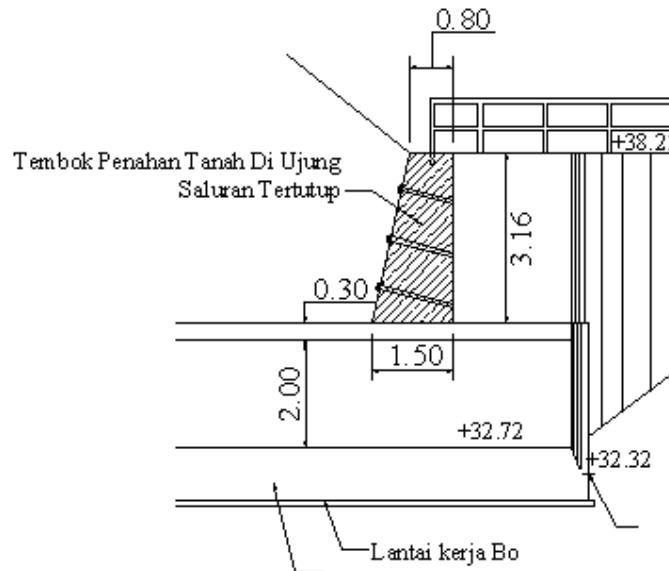


**Gambar 8.11 Tembok Penahan Banjir pada Bangunan Pintu Pengambilan Bendung**

Volume :

$$(1+2)*0.5*4.96*10.3 = 76.63 \text{ m}^3$$

**c. Tembok Penahan Tanah Di Ujung Saluran Tertutup Bangunan  
Pengambilan Bendung**

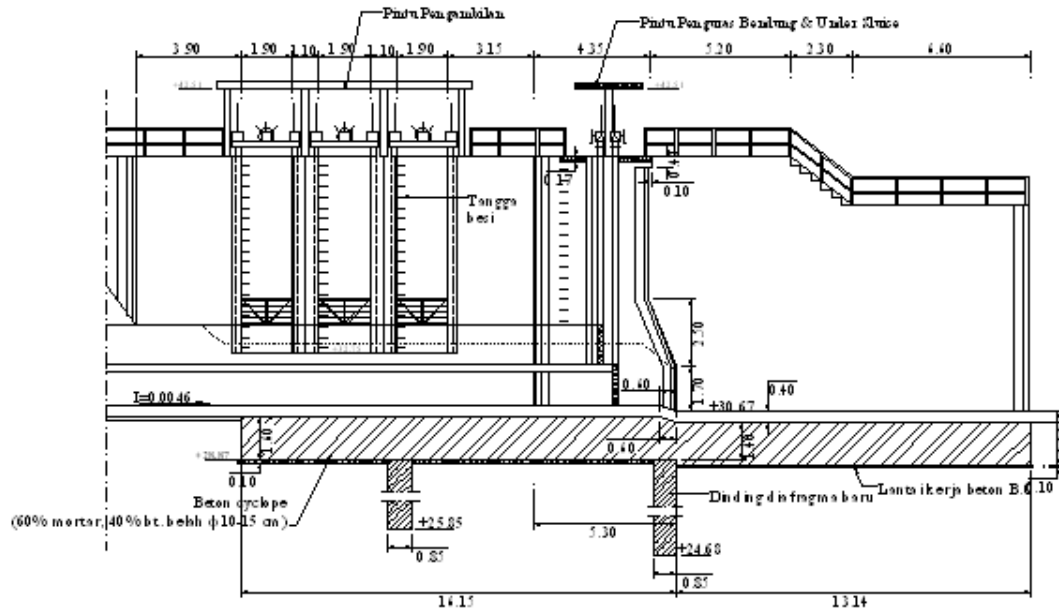


**Gambar 8.12 Tembok Penahan Tanah Di Ujung Saluran Tertutup Bangunan  
Pengambilan Bendung**

Volume :

$$(0.8+1.5)*0.5*3.16*31.15 = 113.199 \text{ m}^3$$

#### d. Pintu Penguras Bendung



**Gambar 8.13 Pintu Penguras Bendung**

Volume :

$$6.8 * 1.7 * 8.15 = 94.214 \text{ m}^3$$

$$9.79 * 2.5 * 20.85 = 510.304 \text{ m}^3$$

$$(1.4 + 3.8) * 0.5 * 8.54 * 20 = 444.08 \text{ m}^3$$

$$1 * 8.54 * 4.2 = 35.868 \text{ m}^3$$

$$1.5 * 8.54 * 18.5 = 236.985 \text{ m}^3$$

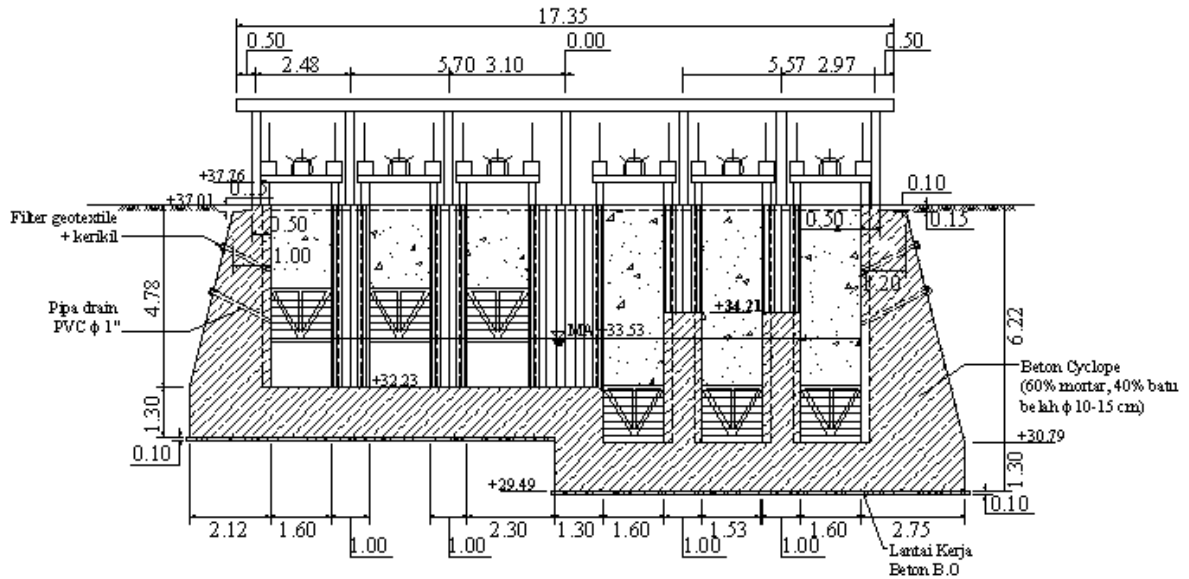
$$1.5 * 7.57 * 4.45 = 50.53 \text{ m}^3$$

$$0.3 * 0.8 * 9.15 = 2.196 \text{ m}^3$$

$$0.75 * 4.5 * 9.15 = \underline{30.881 \text{ m}^3}$$

$$\text{Volume total} = 1405.058 \text{ m}^3$$

**e. Pintu Penerus dan Penguras Kantong Lumpur**



**Gambar 8.14 Pintu Penerus dan Penguras Kantong Lumpur**

Volume :

$$9.6 * .3 * 22.55 = 281,424 \text{ m}^3$$

$$1.3 * 2.74 * 7.22 = 15.03 \text{ m}^3$$

$$1.3 * 2 * 5.66 = 14.716 \text{ m}^3$$

$$1.3 * 2 * 24.52 = 63.752 \text{ m}^3$$

$$(1+2.12) * 0.5 * 4.78 * 22.55 = 168.151 \text{ m}^3$$

$$(1+2.75) * 0.5 * 6.22 * 29.3 = 341.711 \text{ m}^3$$

$$2 * 1 * 4.78 * 3.2 = 30.592 \text{ m}^3$$

$$2 * 1 * 3.42 * 8.5 = 58.14 \text{ m}^3$$

$$2 * 1 * 2.8 * 3.2 = 17.92 \text{ m}^3$$

$$\text{Volume total} = 991.436 \text{ m}^3$$

### 8.1.5 Perhitungan Volume Beton Bertulang

#### a. Volume *Under Sluice*

Berdasarkan potongan P0 – P6 seperti pada gambar denah Bendung terlampir, maka volume under sluice dapat ditentukan sebagai berikut:

Volume:

Didepan mulut *under sluice*:

$$\begin{aligned}0.4*1.5*29.12 &= 17.472 \text{ m}^3 \\(4.6*0.4*29.42)-(0.5*4.6*0.4*9.14) &= 42.172 \text{ m}^3 \\(4.04*0.4*19.98)-(0.5*4.04*0.4*6.85) &= 26.753 \text{ m}^3 \\(2*0.4*13.13)-(0.5*2*0.4*0.83) &= \underline{10.172 \text{ m}^3} \\ \text{Volume total} &= 99.569 \text{ m}^3\end{aligned}$$

P0 – P1:

$$\begin{aligned}0.3*3.1*5 &= 4.65 \text{ m}^3 \\12.3*0.4*5 &= 24.6 \text{ m}^3 \\12.3*0.3*5 &= 18.45 \text{ m}^3 \\0.3*1.25*5 &= 1.875 \text{ m}^3 \\0.3*3.1*5 &= 4.05 \text{ m}^3 \\0.4*0.6*5 &= \underline{1.2 \text{ m}^3} \\ \text{Volume total} &= 54.825 \text{ m}^3\end{aligned}$$

P1 – P2

$$\begin{aligned}0.3*3.1*5 &= 4.65 \text{ m}^3 \\8.98*0.4*5 &= 17.96 \text{ m}^3 \\8.98*0.3*5 &= 13.47 \text{ m}^3 \\0.3*1.25*5 &= 1.875 \text{ m}^3 \\0.3*3.1*5 &= 4.65 \text{ m}^3 \\0.4*0.6*5 &= \underline{1.2 \text{ m}^3} \\ \text{Volume total} &= 43.805 \text{ m}^3\end{aligned}$$

P2 – P3

$$\begin{aligned}0.3*3.1*5 &= 4.65 \text{ m}^3 \\6.96*0.4*5 &= 13.92 \text{ m}^3 \\6.96*0.3*5 &= 10.44 \text{ m}^3\end{aligned}$$



$$0.3*1.25*5 = 1.875 \text{ m}^3$$

$$0.3*3.1*5 = 4.65 \text{ m}^3$$

$$0.4*0.6*5 = \underline{1.2 \text{ m}^3}$$

$$\text{Volume total} = 36.785 \text{ m}^3$$

P3 – P4

$$0.3*3.1*5 = 4.65 \text{ m}^3$$

$$5.94*0.4*5 = 1.88 \text{ m}^3$$

$$5.94*0.3*5 = 8.91 \text{ m}^3$$

$$0.3*1.25*5 = 1.875 \text{ m}^3$$

$$0.3*3.1*5 = 4.65 \text{ m}^3$$

$$0.4*0.6*5 = \underline{1.2 \text{ m}^3}$$

$$\text{Volume total} = 33.165 \text{ m}^3$$

P4 – P5

$$0.3*3.1*5 = 4.65 \text{ m}^3$$

$$5.36*0.3*5 = 10.72 \text{ m}^3$$

$$5.36*0.3*5 = 8.04 \text{ m}^3$$

$$8.3*1.25*5 = 1.875 \text{ m}^3$$

$$0.3*3.1*5 = 4.65 \text{ m}^3$$

$$0.4*0.6*5 = \underline{1.2 \text{ m}^3}$$

$$\text{Volume total} = 31.135 \text{ m}^3$$

P5 – P6

$$0.3*3.1*4 = 4.65 \text{ m}^3$$

$$4.96*0.4*5 = 9.92 \text{ m}^3$$

$$4.96*0.3*5 = 7.44 \text{ m}^3$$

$$0.3*1.25*5 = 1.875 \text{ m}^3$$

$$0.3*3.1*5 = 4.65 \text{ m}^3$$

$$0.4*0.6*5 = \underline{1.2 \text{ m}^3}$$

$$\text{Volume total} = 29.735 \text{ m}^3$$

P6 – P7

$$5*0.3*2.9 = 4.35 \text{ m}^3$$

$$4.7*0.4*2.9 = 5.452 \text{ m}^3$$

$$0.3 \times 1.75 \times 2.9 = 1.088 \text{ m}^3$$

$$0.3 \times 3.1 \times 2.9 = 2.697 \text{ m}^3$$

$$0.4 \times 0.6 \times 2.9 = \underline{0.696 \text{ m}^3}$$

$$\text{Volume total} = 14.283 \text{ m}^3$$

P7 – Ujung Pilar Pintu Penguras Bendung

$$5.1 \times 0.3 \times 8.36 = 12.699 \text{ m}^3$$

$$4.5 \times 0.4 \times 8.3 = 14.94 \text{ m}^3$$

$$0.3 \times 1.25 \times 8.3 = \underline{3.113 \text{ m}^3}$$

$$\text{Volume total} = 30.752 \text{ m}^3$$

Ujung Pilar Pintu Penguras Bendung – Akhir Pilar Pintu Penguras Bendung

$$2 \times 2.35 \times 0.3 \times 5.2 = 7.332 \text{ m}^3$$

$$2 \times 1.75 \times 0.4 \times 5.2 = \underline{7.28 \text{ m}^3}$$

$$\text{Volume total} = 14.612 \text{ m}^3$$

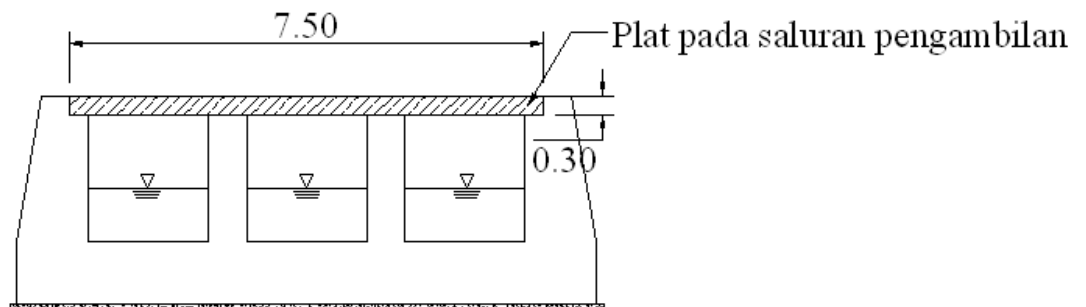
Akhir Pilar Pintu Penguras Bendung – Akhir Kolam Olak

$$4.5 \times 0.3 \times 21.85 = 29.498 \text{ m}^3$$

$$0.4 \times 1.1 \times 4.5 = \underline{1.98 \text{ m}^3}$$

$$\text{Volume total} = 31.478 \text{ m}^3$$

#### b. Plat pada Saluran Pengambilan



**Gambar 8.15 Plat pada Saluran Pengambilan**

Volume :

$$26.3*0.3*7.5 = 59.175 \text{ m}^3$$

$$0.2*1.1*7.5 = \underline{1.65 \text{ m}^3}$$

$$\text{Volume total} = 60.825 \text{ m}^3$$

**c. Plat Pelayanan dan Breast Wall**

Berdasarkan gambar terlampir, volume plat pelayanan dan breast wall dapat dihitung sebagai berikut:

Penguras Bendung (depan) :

$$2*2.09*0.17*1 = 0.355 \text{ m}^3$$

Penguras Bendung (belakang) :

$$2*2.09*0.17*1.2 = 0.853 \text{ m}^3$$

Penerus Saluran Induk :

$$3*1.94*0.17*1 = 0.989 \text{ m}^3$$

$$3*0.17*3.15*1.94 = 3.117 \text{ m}^3$$

$$3*((0.15+0.05)*0.5*0.03*1.94) = \underline{0.017 \text{ m}^3}$$

$$\text{Volume total} = 4.123 \text{ m}^3$$

Penguras Kantong Lumpur :

$$3*1.94*0.17*1 = 0.989 \text{ m}^3$$

$$3*0.17*4.7*1.94 = 4.65 \text{ m}^3$$

$$3*((0.15+0.05)*0.5*0.03*1.94) = \underline{0.017 \text{ m}^3}$$

$$\text{Volume total} = 5.656 \text{ m}^3$$

**d. Kantong Lumpur**

Berdasarkan gambar terlampir volume kantong lumpur dapat ditentukan sebagai berikut:

$$7*0.2*160 = 224 \text{ m}^3$$

$$2*((0.39+1.59)*0.5*160*0.2) = \underline{63.36 \text{ m}^3}$$

$$\text{Volume total} = 287.36 \text{ m}^3$$

**e. Diafragma**

Berdasarkan gambar terlampir volume diafragma dapat ditentukan sebagai berikut:

$$0.85*3.02*93.6 = 240.271 \text{ m}^3$$

$$0.85*4.19*93.6 = \underline{333.356 \text{ m}^3}$$

$$\text{Volume total} = 573.627 \text{ m}^3$$

**8.1.6 Perhitungan Volume Lantai Kerja**

Berdasarkan gambar terlampir, maka volume lantai kerja dapat dihitung sebesar :

*Under Sluice*

$$(12.3+4.5)*0.5*44*0.1 = 36.96 \text{ m}^3$$

Bangunan Pengambilan

$$13.73*3.1*0.1 = 4.256 \text{ m}^3$$

Saluran Pengambilan

$$9.2*26.3*0.1 = 24.2 \text{ m}^3$$

Bangunan Penguras Bendung

$$4.5*22.85*0.1 = 10.28 \text{ m}^3$$

Bangunan Kantong Lumpur

$$((0.82*2)+7.4)*160*0.1 = 169.28 \text{ m}^3$$

Bangunan Penguras Kantong Lumpur

$$30*12.3*0.1 = 36.9 \text{ m}^3$$

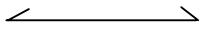
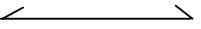
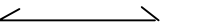
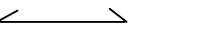

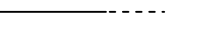
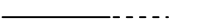
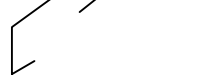
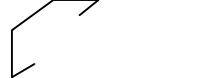
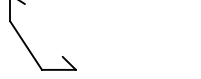
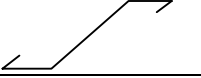
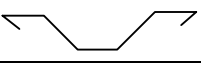
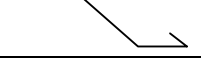
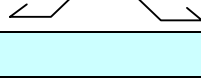
Bangunan Penerus Kantong Lumpur

$$22*11.01*0.1 = 24.3 \text{ m}^3$$

### 8.1.7 Perhitungan Volume Pembesian Beton Bertulang

#### a. Saluran Under Sluice

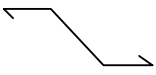
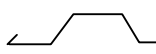
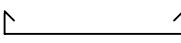
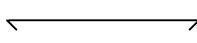
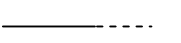
Tabel 8.1 Pembesian Under Sluice

No. Tul.	Sket	Diameter	Berat/m'	Panjang	Jumlah	Jml. Berat
		(mm)	(kg)	(m)	(bh)	(kg)
1		16	1.578	9.23	20	291.2988
2		16	1.578	9.23	20	291.2988
3		16	1.578	5.34	20	168.5304
4		16	1.578	1.98	20	62.4888
5		16	1.578	5.89	20	185.8884
6		10	0.617	1	368	227.056
7		10	0.617	1	132	81.444
8		12	0.888	1.5	10	13.32
9		12	0.888	1.5	10	13.32
10		12	0.888	1.7	20	30.192
11		12	0.888	1.17	20	20.7792
12		12	0.888	1.94	10	17.2272
13		12	0.888	1.03	20	18.2928
14		12	0.888	1.66	10	14.7408
<b>JUMLAH</b>						<b>1435.877</b>

Panjang Under Sluice adalah 43.50, jadi berat keseluruhan sama dengan 62460.64 kg.

**b. Plat Saluran Pengambilan**

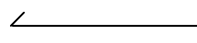

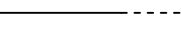
**Tabel 8.2 Penulangan Plat Saluran Pengambilan**

No. Tul.	Sket	Diameter	Berat/m'	Panjang	Jumlah	Jml. Berat
		(mm)	(kg)	(m)	(bh)	(kg)
1		12	0.888	1	10	8.88
2		12	0.888	1.45	10	12.876
3		12	0.888	8	10	71.04
4		12	0.888	7.5	10	66.6
5		12	0.888	1	76	67.488
<b>JUMLAH</b>						<b>226.884</b>

Panjang saluran pengambilan 23.30 m, jadi berat total = 5967.049 kg

**c. Kantong Lumpur**

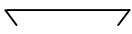
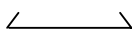

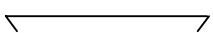
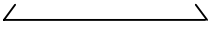
**Tabel 8.3 Penulangan Kantong Lumpur**

No. Tul.	Sket	Diameter	Berat/m'	Panjang	Jumlah	Jml. Berat
		(mm)	(kg)	(m)	(bh)	(kg)
1		10	0.617	7.5	6	27.765
2		10	0.617	2	12	14.808
3		10	0.617	1	51	31.467
<b>JUMLAH</b>						<b>74.04</b>

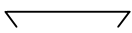
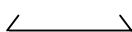

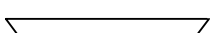
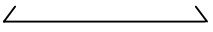
Panjang kantong lumpur 160 m, jadi berat total = 11846.4 kg

**d. Plat Pelayanan dan *Breast Wall***

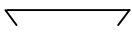
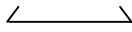

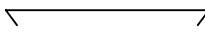




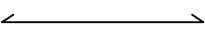

**Tabel 8.4 Penulangan Plat Pelayanan Penguras Bendung (depan)**

No. Tul.	Sket	Diameter	Berat/m'	Panjang	Jumlah	Jml. Berat
		(mm)	(kg)	(m)	(bh)	(kg)
1		10	0.617	0.94	11	6.37978
2		10	0.617	0.94	11	6.37978
3		10	0.617	2.18	6	8.07036
4		10	0.617	2.03	5	6.26255
5		10	0.617	2.03	5	6.26255
JUMLAH						33.35502

**Tabel 8.5 Penulangan Plat Pelayanan Penguras Bendung (belakang)**

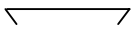
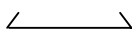

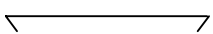
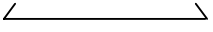



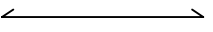

No. Tul.	Sket	Diameter	Berat/m'	Panjang	Jumlah	Jml. Berat
		(mm)	(kg)	(m)	(bh)	(kg)
1		10	0.617	1.14	11	7.73718
2		10	0.617	1.14	11	7.73718
3		10	0.617	2.18	6	8.07036
4		10	0.617	2.03	5	6.26255
5		10	0.617	2.03	5	6.26255
JUMLAH						36.06982

**Tabel 8.6 Penulangan Plat Pelayanan & Breast Wall Pintu Penerus**

No. Tul.	Sket	Diameter	Berat/m'	Panjang	Jumlah	Jml. Berat
		(mm)	(kg)	(m)	(bh)	(kg)
1		10	0.617	1.14	11	7.73718
2		10	0.617	1.14	11	7.73718
3		10	0.617	2.18	6	8.07036
4		10	0.617	2.03	5	6.26255
5		10	0.617	2.03	5	6.26255
6		10	0.617	0.89	12	6.58956
7		10	0.617	3.33	12	24.65532
8		10	0.617	3.33	12	24.65532
9		10	0.617	2.28	17	23.91492
10		10	0.617	2.28	17	23.91492
JUMLAH						139.7999



**Tabel 8.7 Penulangan Plat Pelayanan & Breast Wall Pintu Penguras Kantong Lumpur**

No. Tul.	Sket	Diameter	Berat/m'	Panjang	Jumlah	Jml. Berat
		(mm)	(kg)	(m)	(bh)	(kg)
1		10	0.617	1.14	11	7.73718
2		10	0.617	1.14	11	7.73718
3		10	0.617	2.18	6	8.07036
4		10	0.617	2.03	5	6.26255
5		10	0.617	2.03	5	6.26255
6		10	0.617	0.89	12	6.58956
7		10	0.617	4.88	12	36.13152
8		10	0.617	4.88	12	36.13152
9		10	0.617	2.28	25	35.169
10		10	0.617	2.28	25	35.169
<b>JUMLAH</b>						<b>185.2604</b>

**e. Bangunan Pengambilan**

**Tabel 8.8 Penulangan Bangunan Pengambilan**

No. Tul.	Sket	Diameter	Berat/m'	Panjang	Jumlah	Jml. Berat
		(mm)	(kg)	(m)	(bh)	(kg)
1		25	3.853	3.1	12	143.3316
2		25	3.853	8.3	12	383.7588
3		25	3.853	8.03	12	371.2751
4		25	3.853	2.5	8	77.06
5		25	3.853	1	148	570.244
6		18	1.998	3.1	12	74.3256
7		18	1.998	8.03	12	192.5273
8		18	1.998	8.03	12	192.5273
9		18	1.998	1.1	8	17.5824
10		18	1.998	1	144	287.712
16		20	2.466	14.3	6	211.5828
17		20	2.466	14.3	6	211.5828
18		20	2.466	1	142	350.172
<b>JUMLAH</b>						<b>3083.682</b>

Panjang bangunan pengambilan adalah 3.7 m, jadi berat total 11409,62 kg

**f. Banjir Scherm**




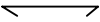




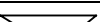
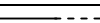



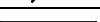
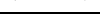
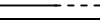

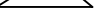
**Tabel 8.9 Penulangan Banjir Scherm**

No. Tul.	Sket	Diameter	Berat/m'	Panjang	Jumlah	Jml. Berat
		(mm)	(kg)	(m)	(bh)	(kg)
1		20	2.466	2.38	6	35.21448
2		20	2.466	5.3	6	78.4188
3		20	2.466	5.11	6	75.60756
4		20	2.466	1.7	4	16.7688
5		20	2.466	1	50	123.3
<b>JUMLAH</b>						<b>329.3096</b>

Panjang banjir *scherm* adalah 10.3 m, jadi berat total 3391.89 kg

**g. Bangunan Penguras Bendung**










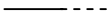



**Tabel 8.10 Penulangan Bangunan Penguras Bendung**

No. Tul.	Sket	Diameter	Berat/m'	Panjang	Jumlah	Jml. Berat
		(mm)	(kg)	(m)	(bh)	(kg)
1		28	4.834	3.56	6	103.2542
2		28	4.834	10.2	6	295.8408
3		28	4.834	10.04	6	291.2002
4		28	4.834	2.5	4	48.34
5		28	4.834	1	96	464.064
6		16	1.578	3.16	6	29.91888
7		16	1.578	10.04	6	95.05872
8		16	1.578	10.04	6	95.05872
9		16	1.578	1	1	1.578
10		16	1.578	1	90	142.02
11		20	2.466	3.4	6	50.3064
12		20	2.466	10.04	6	148.5518
13		20	2.466	10.04	6	148.5518
14		20	2.466	1.5	4	14.796
15		20	2.466	1	90	221.94
16		25	3.853	9.8	6	226.5564
17		25	3.853	9.8	6	226.5564
18		25	3.853	1	98	377.594
<b>JUMLAH</b>						<b>2981.186</b>

Panjang bangunan penguras bendung adalah 29.3 m, jadi berat total 87348.75 kg

### h. Bangunan Penguras Kantong Lumpur














**Tabel 8.11 Penulangan Penguras Kantong Lumpur**

No. Tul.	Sket	Diameter	Berat/m'	Panjang	Jumlah	Jml. Berat
		(mm)	(kg)	(m)	(bh)	(kg)
1		22	2.984	3.1	12	111.0048
2		22	2.984	7	12	250.656
3		22	2.984	6.8	12	243.4944
4		22	2.984	1.9	8	45.3568
5		22	2.984	1	120	358.08
6		16	1.578	3.1	12	58.7016
7		16	1.578	6.8	12	128.7648
8		16	1.578	6.8	12	128.7648
9		16	1.578	1	8	12.624
10		16	1.578	1	68	107.304
16		19	2.226	12.3	6	164.2788
17		19	2.226	12.3	6	164.2788
18		19	2.226	1	120	267.12
<b>JUMLAH</b>						<b>2040.429</b>

Panjang bangunan penguras kantong lumpur adalah 40.26 m, jadi berat total 82147.67 kg

**i. Bangunan Penerus Kantong Lumpur**

**Tabel 8.12 Penulangan Penerus Kantong Lumpur**

No. Tul.	Sket	Diameter	Berat/m'	Panjang	Jumlah	Jml. Berat
		(mm)	(kg)	(m)	(bh)	(kg)
1		20	2.466	3.1	12	91.7352
2		20	2.466	5.6	12	165.7152
3		20	2.466	5.4	12	159.7968
4		20	2.466	2	8	39.456
5		20	2.466	1	120	295.92
6		16	1.578	3.1	12	58.7016
7		16	1.578	5.4	12	102.2544
8		16	1.578	5.4	12	102.2544
9		16	1.578	1	8	12.624
10		16	1.578	1	54	85.212
16		19	2.226	11.04	6	147.4502
17		19	2.226	11.04	6	147.4502
18		19	2.226	1	110	244.86
<b>JUMLAH</b>						<b>1653.43</b>

Panjang bangunan penerus kantong lumpur adalah 21.61 m, jadi berat total 35730.62 kg

**j. Penahan Tanah diakhir Saluran Intake**

**Tabel 8.13 Penulangan Penahan Tanah diakhir Saluran Intake**

No. Tul.	Sket	Diameter	Berat/m'	Panjang	Jumlah	Jml. Berat
		(mm)	(kg)	(m)	(bh)	(kg)
1		18	1.998	2.8	6	33.5664
2		18	1.998	3.3	6	39.5604
3		18	1.998	3.16	6	37.88208
4		18	1.998	1.2	4	9.5904
5		18	1.998	1	32	63.936
<b>JUMLAH</b>						<b>184.5353</b>

Panjang penahan tanah di saluran intake adalah 23.78 m, jadi berat total 4388.25 kg

**8.1.8 Perhitungan Luas Bekisting**

Dari hasil perhitungan berdasarkan gambar terlampir diperoleh luas bekisting sebagai berikut:

Pengambilan =  $294.322 \text{ m}^2$

Penguras Bendung =  $590.704 \text{ m}^2$

Penerus Kantong Lumpur =  $725 \text{ m}^2$

Penguras Kantong Lumpur =  $850 \text{ m}^2$

Banjir *Scherm* =  $117.056 \text{ m}^2$

Tembok Penahan Tanah Diakhir Intake =  $160.402 \text{ m}^2$

Saluran *Under Sluice* =  $497.7 \text{ m}^2$

Plat Pelayan & *Breast Wall*

- Penguras Bendung (depan & belakang) =  $14.3 \text{ m}^2$

- Penguras Kantong Lumpur =  $42.342 \text{ m}^2$

- Penerus Kantong Lumpur =  $31.461 \text{ m}^2$

Kantong Lumpur =  $5 \text{ m}^2$

Plat Penutup & Saluran Intake =  $594.38 \text{ m}^2$

### **8.1.9 Perhitungan Luas Plesteran**

Dari hasil perhitungan berdasarkan gambar terlampir diperoleh luas acuan sebagai berikut:

$$\text{Pengambilan} = 135 \text{ m}^2$$

$$\text{Penguras Bendung} = 352.8 \text{ m}^2$$

$$\text{Penerus Kantong Lumpur} = 204 \text{ m}^2$$

$$\text{Penguras Kantong Lumpur} = 320 \text{ m}^2$$

$$\text{Saluran } \textit{Under Sluice} = 234 \text{ m}^2$$

$$\text{Kantong Lumpur} = 1628.8 \text{ m}^2$$

### **8.1.10 Perhitungan Volume Batu Lindung**

Dari hasil perhitungan berdasarkan gambar terlampir diperoleh volume batu lindung sebagai berikut:

$$16.14 * 93 * 1.04 = 1561.06 \text{ m}^3$$

### **8.1.11 Perhitungan Luas Gebalan Rumput**

Luas gebalan rumput :

$$1.2 * 160 = 192 \text{ m}^2$$

$$3.25 * 160 * 2 = \underline{1040 \text{ m}^2}$$

$$\text{jumlah} = 1232 \text{ m}^2$$

## **8.2 Perhitungan Rencana Anggaran Biaya**

Untuk merencanakan anggaran biaya diperlukan analisa anggaran yang mana diperlukan pengetahuan harga bahan dan upah. Besarnya harga bahan dan upah dapat dilihat pada Tabel 8.14 berikut :

**Tabel 8.14 Daftar Harga Bahan dan Upah**

No	Uraian	Satuan	Harga (Rp)
<b>I</b>	<b>Upah</b>		
1	Pekerja	hari	19,000.00
2	Mandor	hari	25,000.00
3	Tukang	hari	24,000.00
4	Kepala Tukang	hari	28,000.00
5	Sopir	hari	22,000.00
<b>II</b>	<b>Bahan</b>		
1	Batu Belah	m <sup>3</sup>	75,000.00
2	Batu Pecah	m <sup>3</sup>	95,000.00
3	Pasir Pasang	m <sup>3</sup>	53,000.00
4	Pasir Beton	m <sup>3</sup>	65,000.00
5	Portland Cement (40 kg)	sak	28,000.00
6	Portland Cement (50 kg)	sak	35,000.00
7	Besi Beton	kg	5,000.00
8	Kawat Bendrat	kg	7,500.00
9	Paku	kg	6,000.00
10	Kayu Begisting	m <sup>3</sup>	700,000.00
11	Additive	liter	26,000.00
12	Pintu Intake	buah	7,500,000.00
13	Pintu Penguras Bendung	buah	15,000,000.00
14	Pintu Penguras Kantong Lumpur	buah	5,000,000.00
15	Pintu Penerus	buah	5,000,000.00
<b>III</b>	<b>Alat</b>		
1	Stamper	Jam	8,000.00
2	Alat Bantu	set	31,000.00
3	Dump Truck	jam	82,000.00
4	Concrete Mixer	jam	60,000.00
5	Concret Vibrator	Jam	31,000.00
6	Water Pump	Jam	8,000.00

*Sumber : PSDA Jawa Tengah (2005)*

Dari harga bahan dan upah selanjutnya dilakukan analisa harga satuan pekerjaan untuk tiap volume pekerjaan. Hasil analisa harga satuan pekerjaan dapat dilihat pada Tabel 8.15 berikut :















### **8.3 Jadwal Pelaksanaan**

#### **8.3.1 Net Work Planing**

### **8.3.2 Kurva S**



### **8.3.3 Analisa Kebutuhan Tenaga Kerja**

